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THE REVIEW

DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR METALS

Volume X APRIL, 1937 No. 4

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Classifies Uses Of Molybdenum In 4 Divisions

Tisdale Discusses Molybdenum in Cast Iron, Cast and Rolled Steel, Chemical Uses and Miscellaneous Uses

By B. L. McCarthy

Buffalo Chapter—Uses of molybdenum can be classified in four categories, according to Norman F. Tisdale, metallurgical engineer, Molybdenum Corp. of America, Pittsburgh, speaking before the meeting on March 11.

They are: (*a*) Cast iron, (*b*) steel—cast and rolled, (*c*) chemical, and (*d*) miscellaneous.

In cast iron molybdenum increases tensile, transverse and fatigue strength. It acts as a moderate hardener.

Mo Iron for Machining

Molybdenum iron machines better because the graphite is formed into fine, curved particles and the formation of massive carbide is greatly reduced. While molybdenum is a non-graphitizer, it toughens the chill in chill-cast iron.

Molybdenum irons are used in pressure castings, rolls, and all types of iron requiring resistance to abrasive wear and extra physical properties.

Cast molybdenum steels may be of the carbon-molybdenum, manganese-molybdenum, nickel-chromium-molybdenum and chromium-molybdenum types. Manganese-molybdenum steel is in general use, and the others are for special applications.

In the stainless field molybdenum is added to the standard analysis to increase resistance to creep, and to corrosion, especially by sulphur and sulphur derivatives, and to reduce temper brittleness.

Increases Creep Resistance

In oil service the 4 to 6% chromium, 0.5% molybdenum steel has wide application.

Molybdenum is widely used in carburizing steels such as S.A.E. 4615 and S.A.E. 4815. Added to the S.A.E. 3000 series, it produces an excellent steel for high impact service.

The carbon-molybdenum "Mola" steels used by Chrysler are made to special grain size specifications and have high fatigue strength and all-around physical properties.

Rail Life Doubled

Molybdenum is used to make a low alloy sheet steel of good corrosion resistance for deep drawing.

Life of rail steels has been doubled by the use of 0.40% molybdenum. In gas tanks S.A.E. 4100 steels reduce weight and provide proper structure for ductility of material.

Tool steels are frequently made with molybdenum and recently a high speed steel using molybdenum as the main alloying element has been developed.

Molybdenum chemicals are used in the dye industry, this element causing complete precipitation of the basic dyestuffs from water solutions. Molybdenum powder and wire are produced from the chemicals.

Many years of research in the non-ferrous field are finally showing signs of useful applications of molybdenum. As a nucleus for casting non-ferrous alloys, it promotes fine grain.

Elected to Head Texas Chapter

Officers of the New Texas Chapter Were Snapped With National President Bain and National Secretary Eisenman at the First Meeting of the Chapter. Above (Left to Right)—A.S.M. Past President Robert G. Guthrie; Charles F. Lewis, elected secretary-treasurer; Robert W. Schlumpf, chairman; and President Bain.

Left—Vice-Chairman C. H. Shapiro (Left) and National Secretary W. H. Eisenman (Right).

Roller Bearings Have Wide Industrial Uses

By T. P. Black, Jr.

Peoria Chapter — After the dinner 160 men assembled in the Caterpillar Tractor Co. show-room for the technical program. Technical Chairman M. A. Ammon, Caterpillar Tractor Co., introduced Varian Steele of the Timken Roller Bearing Co., Canton, Ohio.

Mr. Steele has had wide experience in his subject of tapered roller bearings and was well qualified to discuss both the manufacture and application of these bearings to the needs of industry.

His talk was well illustrated with slides showing the different types made, and was further accompanied by talking motion pictures which were filmed in the Ford Motor Plant, particularly in the steel rolling mill departments, showing the wide use of this type of bearing. Other films taken at Carnegie-Illinois Steel Corp. also showed the wide and varied applications of Timken roller bearings.

The Chapter feels deeply indebted to the Timken Roller Bearing Co. for providing this excellent program on such short notice after the death of T. B. Bechtel of the Electric Furnace Co. who was first scheduled for this meeting.

Miss His A. S. M. Mail— Never, Says Loyal Member

One of the most frank and truthful letters ever received by the A.S.M. recently made its way to the National Office. It read as follows:

"Recently I have been receiving various items through the mail from the Society addressed to my home. My home is, I believe, like all others in that personal mail for the head of the house is not treated with very much respect, and unless it looks like something important, finds its way to the wastebasket.

"As I do not want this to happen with the mail from the A.S.M., I shall appreciate your changing my mailing address in all cases to my office."

So say we all!

Junior Members Are Chapter Guests

Hear D. K. Crampton Talk on Correlation of Some Properties of Copper Alloys

By Hugh E. Brown

Cleveland Chapter — It was Junior Members' Night at the Cleveland Club March 1. Forty young men attended this session as guests of the Chapter, representing both Case School and Fenn College.

Chairman Harry Croft welcomed these Juniors and called on Prof. A. A. Bates of Case School for a short talk. Following this Charles W. Francis of Fenn College addressed the boys and urged them to keep up their membership and come to the meetings regularly.

Dr. D. K. Crampton, director of research of the Chase Brass & Copper Co., gave the address of the evening which was entitled "Correlation of Some Properties of Copper Alloys." This talk represented the cream of considerable data which have been collected by the Chase research department on the copper alloys.

One of the pertinent points brought out was that each individual element when added to copper contributes its own particular effect in the alloy. It was shown that the tensile properties of silicon bronze are determined by the silicon, and the addition of other elements will not affect the tensile properties but may give the alloy other important properties.

Dr. Crampton showed how the binary, ternary, and more complex alloys could be so constituted as to obtain the properties desirable for a particular application. Machinability can be accomplished by certain additions, corrosion resistance by others, and even the approximate electrical conductivity that might be expected of an alloy can be calculated.

The attendance of 380 at this meeting showed the interest that the American Society for Metals is building up in non-ferrous work.

Chairman Harry Croft announced the appointment of the Nominating Committee for election of Chapter officers, consisting of Dr. Kent R. Van Horn, chairman, and Erle Ross and Harry Pulsifer.

New Chapter Organized at Houston, Texas

Two Meetings Held in March; Plans Made for Lecture Course on Heat Treatment of Steel

It did not take Houston long to join Puget Sound and Oregon in becoming the youngest chapters in the American Society for Metals.

About a month before the arrival of President Bain and Secretary Eisenman, the 25 men already members of the Society held a meeting and elected temporary officers so that when the national officers arrived on March 10 everything was all set for a rousing meeting.

This first official meeting of the Texas Chapter was addressed by President Bain and Secretary Eisenman. President Bain's lecture was enjoyed to the fullest extent by 130 members.

Memberships in the Texas Chapter have rolled in to such an extent that at present there are over 100 members, of whom 8 are sustaining.

. The second meeting was held on March 23. Motion pictures of mining, smelting and rolling of carbon steel were shown by A. E. Crockett of the Jones & Laughlin Steel Co. Attendance was about 150.

Plans have already been made under the direction of Charles H. Shapiro, vice-chairman of the Chapter and head of the Educational Committee, for a series of lectures based upon Keller's "Heat Treatment of Steel."

The Texas Chapter considers itself quite fortunate in that it has on its executive committee three individuals who have had experience in other chapters of the Society. They are: Secretary-Treasurer C. F. (Charlie) Lewis, sales metallurgist, Cook Heat Treating Corp., who was for two years secretary-treasurer of the Los Angeles Chapter; R. E. (Bob) Sherlock, Youngstown Sheet & Tube Co., who is a past chairman of the Buffalo Chapter; and W. W. (Wade) Hampton, production manager, Hughes Tool Co., who for two years was chairman of the Los Angeles Chapter.

Other officers are: Chairman—R. W. (Bob) Schlumpf, metallurgist, Hughes Tool Co.; Vice-Chairman—C. H. Shapiro, metallurgist, Reed Roller Bit Co.; Executive Committee—C. W. (Charlie) East, district sales manager, Republic Steel Corp.; G. G. (George) Harrington, chief engineer, Reed Roller Bit Co.; R. R. (Bob) Grove, production superintendent, Cameron Iron Works; A. J. (Art) Stetter, district manager, Earle M. Jorgensen Co; and R. M. (Don) Garrison, chief engineer, Mission Mfg. Co.

Middle Atlantic Meeting

The middle Atlantic chapters of the American Society for Metals will join on May 14 for a group chapter meeting, with the New Jersey Chapter playing host at Newark to the New York, Philadelphia and Lehigh Valley Chapters.

Details have not yet been completed, but the meeting will last all day, with a technical session in the morning, a plant visitation in the afternoon, and an evening dinner with a well-known speaker.

THE REVIEW

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RAY T. BAYLESS.....*Editor*
M. R. HYSLOP.....*Managing Editor*

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Gleanings . . .
. . . from the chapters

Go West, A.S.M. . . .

And going west the Society is, with three new chapters, one in Seattle, Wash., one in Portland, Ore., announced last month, and now a third thriving new chapter of over 100 members in Houston, Texas. The grass may grow high down in that country, but we're willing to wager it won't grow under these boys' feet.

Our congratulations to all three for a flying start!

Reminder . . .

The following letter is being sent out by Chairman Harry Croft of the Cleveland Chapter to those careless members who have so far neglected to pay their dues:

As you know, the officers for the coming year will be installed at the May 3rd meeting of the chapter after which date I shall be able to sit down and enjoy life by heckling them.

Since the chairman-elect is a rather frail individual* I want to do everything possible to prevent him from overworking during the first few months of his term. Consequently, if I can save him the trouble of having to tramp around ringing doorbells in order to collect dues, I would like to do so.

No doubt this little matter has slipped your mind and if so, I hope that you can drop the old ten-spot into the mail this week. If you have already sent it in, please file this in the waste basket. That is where form letters belong anyway.

Condensed Education . . .

Past President Bob Guthrie, chief metallurgist of Peoples Gas Light & Coke Co., Chicago, said, after hearing President Eddie Bain's lecture on "The Anomalies of Heat Treatment," that "It's as good as two years in school if you can find a *good* school."

And judging from reports from the other chapters, the opinion is unanimous.

Prize Winner . . .

Worcester didn't fool about the membership drive it recently put on. A handsome prize in the form of a stainless steel carving set contributed by Universal-Cyclops Steel Co. went to George A. Peterson of Pratt and Inman for bringing in most new members. Total membership was increased from 72 to 115 in two months.

*Gordon Williams—215 lb. or thereabouts.

Group Meeting Will Solve Your Problems

Would you like to know just where the element chromium fits into the picture in ferrous metallurgy?

Do you ever wonder how long tubes can be heat treated and be straight enough for high grade accurate shooting rifles?

Have you a longing to see first quality cutlery heat treated so that you may misuse it and have it hold its cutting edge?

Have you ever had the urge to tee a golf ball off the Yale course?

These and other pressing problems will be answered at the New England Sectional Meeting of 1937, when all of the A.S.M. chapters in the New England region will have a joint meeting at the Hotel Taft, New Haven, Conn., on May 21.

An all-day program is planned including a visit to Winchester Repeating Arms Co. in the morning, a technical paper by V. N. Krivobok in the afternoon, and an evening banquet and entertainment.

A special program will be planned for the ladies.

Tri-Chapter Meeting To Be Devoted to Tools and Machining

High speed steel and machinability will form the subject of the annual Tri-Chapter meeting of the Columbus, Dayton and Cincinnati Chapters on April 28 at Battelle Memorial Institute, 505 King Ave., Columbus, Ohio.

James P. Gill, metallurgist, Vanadium-Alloys Steel Co., will open the morning session at 10:30 with a talk on "High Speed Steels." Luncheon will be at 12:30 at the Scioto Country Club.

Two papers will feature the afternoon session beginning at 2:00 p.m. at the Institute. Henry Wysor, metallurgical engineer, Bethlehem Steel Co., will speak on "Machinability of Carbon and Alloy Steel," and J. D. Armour, metallurgist, Union Drawn Steel Co., on "Free Machining Steels."

This will be followed by a discussion on "Free Machining Aluminum Alloys" led by L. W. Kempf, Aluminum Co. of America, and on "Cutting Compounds in Relation to Machinability" by D. J. Richards, district manager, E. F. Houghton & Co.

X1112 Considered One of Best Screw Stock Materials

By F. J. Comerford

Rochester Chapter — Those who braved the wintry blasts on March 16 to hear a talk on "Working Characteristics of Cold Drawn Steel" were more than amply rewarded for their efforts. Thomas D. Taylor, metallurgical engineer, Bliss & Laughlin, Inc., Buffalo, N. Y., is one of the finest speakers ever to address the Rochester Chapter.

Mr. Taylor began his talk by explaining, step by step, the advancement in the manufacture of free-machining screw stock. The early limits for sulphur were first surpassed by the Germans. American manufacturers were reluctant to adopt them because of rolling difficulties, but finally did so, and Mr. Taylor now considers material such as X1112 to be one of the finest screw stock materials in the world today.

Mr. Taylor covered both the higher carbon and alloy screw stocks and gave their rated efficiencies as well as their proper applications in industry.

He paid a great tribute to the service men in the metallurgical departments of the steel industry who are willing at all times to call on consumers and help them out with their metallurgical difficulties.

Mr. Taylor's talk was preceded by a movie showing the manufacture of steel from the mine to the finished bar stock.

The Microscope and Its Illumination Are Explained by Zieler

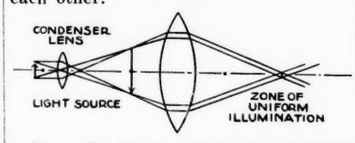
Principles of Resolution are Also Discussed in Talk at Notre Dame Chapter

By Walter C. Troy

Notre Dame Chapter—The microscope, a tool which has probably done more to further metallurgical research than any other, was the topic discussed on March 18 by H. W. Zieler, president of E. Leitz, Inc.

The address consisted of two clearly defined parts: General optical principles pertinent to microscopy, and particular aspects of microscopy which are applied to the metal microscope.

A particularly important observation was that at one point in the optical path the illumination must by principle be completely uniform despite any non-uniformities in the light source. If the real image formed by the condenser lens in the lamp be placed at the focal point of a second convex lens, the rays originally coming from one single point of the light source and leaving the other side of the second convex lens will be parallel to each other.



From the diagram it can be seen that the light from two different points on the source forms overlapping areas on the other side of the second convex lens to form an area of uniform illumination.

Mr. Zieler compared this situation with that produced by allowing water from a number of hoses to play on the same area. Although the different hoses have different pressures, the pressure at the area where they all meet is uniform. In the microscope, an image of this area of uniform illumination is then formed by lenses on the specimen, thus providing uniform illumination on the specimen surface.

Discussing the principles of resolution, Mr. Zieler indicated a very handy rule of thumb. If M is the total magnification and $N.A.$ the numerical aperture, the maximum value of M should not exceed 1000 $N.A.$

This relation arose from the fact that the human eye can separate only those points which distend at least a certain minimum angle when reaching the eye, and it shows the frequent mistake of producing what was termed "empty" magnification.

Ellis Gives Testing Course

A course on the "Physical Testing of Metals and Interpretation of Test Results" was opened by the Ontario Chapter on March 15 in Toronto and on March 16 in Hamilton.

The course consists of five lectures by O. W. Ellis, director of metallurgical research, Ontario Research Foundation, Toronto, and member of the Board of Trustees, A.S.M.

The Ontario Chapter has gone to considerable expense in the making of a motion picture, under the personal direction of Mr. Ellis, illustrating many of the tests, which is being shown in conjunction with these lectures.

DO YOU KNOW THAT

● THAT . . . Hughes Tool Co. of Houston, Texas, manufacturers of oil field equipment, occupies 100 acres, employs 4000 men, is owned by world renowned aviator Howard Hughes, who also owns the brewery on the same site, which is operated by the exhaust steam from the forge plant?

* * *

● THAT . . . the dome of the National Capitol in Washington, built in 1873, is made entirely of cast iron? But that it wasn't quite a new idea because a roof still exists in China that was laid about 1400 A.D. with cast iron plates ¼ in. thick? And it's a very handsome roof, too, somewhat resembling Spanish tile.

* * *

● THAT . . . the Skoda works in Czechoslovakia has devised a method of tempering steel in which oil is replaced by apple juice? And it isn't "apple sauce" either!

* * *

● THAT . . . a copper coin issued in Sweden in 1659 and worth about $5.20 weighed 31 lb. and measured roughly 2 ft. by 1 ft.? Think what that could do to the cash register business today!

* * *

● THAT . . . bi-metal strips of Copnic and Chromel, rolled to a thickness of six millionths of an inch would cost several million dollars per pound? The feat has actually been performed by General Electric engineers, however.

* * *

● THAT . . . six new chapters and groups of the American Society for Metals have been organized since last fall, making a total of 48 chapters scattered over the country from Boston to California, from Texas to Minnesota?

Development of Low Alloy Structural Steels Traced

By F. H. Clark

New York Chapter—E. E. Thum, editor of *Metal Progress*, spoke at the meeting on March 15. Technical chairman was A. B. Kinzel, chief metallurgist, Union Carbide and Carbon Research Laboratories.

Mr. Thum traced the history and development of the use of low alloy steel in static structures such as buildings and in dynamic structures such as bridges and ships.

He spoke of the low alloy chromium steel used in the spans of the famous Eads bridge built in about 1870 and also pointed out how rigorous were the requirements for the wrought iron that went into the floor of this bridge.

The carbon-silicon-manganese low alloy steels have been consumed in structures up to about a million tons. The trend in general has been to decrease the carbon content and increase the silicon and manganese of structural steels in order to increase the yield point.

It is true, also, that high carbon decreases the weldability.

Mr. Thum stressed the fact that when the yield point of steel is increased by 50% or more, it is difficult for the engineer to utilize all of this increase in his design of structures.

It was also pointed out that there is a condition where a very high elastic limit in comparison with the ultimate strength becomes a hazard rather than an advantage, as this narrow range of elastic action may result in brittleness. In general, it is better to have the steel deform plastically and so absorb or dissipate the vibrations set up in structures in service.

Membership Increased 50% By Big Drive

Worcester Chapter Closes Campaign and Presents Prize to George Peterson at Sustaining Members Night on March 4

By C. G. Johnson

Worcester closed a two months' membership drive at the meeting on March 4 which resulted in better than 50% increase.

Sustaining members were guests of honor, and A.S.M. Vice-President G. B. Waterhouse was the speaker of the evening.

In introducing the representatives of sustaining members, Chairman R. R. Tatnall said, in part, "The Chapter owes a large debt of gratitude to the Worcester firms represented by these gentlemen, for their interest and support in the work of the Society."

Dr. Waterhouse was then introduced and, in his capacity as vice-president, gave some very interesting sidelights on the activities of the Society from a national viewpoint.

The award of the membership prize was made to George A. Peterson, of Pratt & Inman, who rolled up a score of 24 points. Runner-up was Hermann Klaucke, of Baldwin-Duckworth Chain Corp., with a score of 7.

The result of the campaign was an increase from 9 to 22 sustaining members and from 63 to 93 regular members since the first of the year.

Donald P. Strand, of Hawkridge Bros., was chairman of the Special Membership Committee. Especial recognition is due to Chester M. Inman and George Peterson, who constituted the Committee for Sustaining Members.

Dr. John P. Walsted, technical chairman, then introduced Prof. I. N. Zavarine, of M.I.T., who showed his high-speed motion picture of the quenching of steel. The film shows the effect of quenching in oil, water, and brine, and brings out in a very unusual manner the formation of vapor pockets, showing clearly the difference in "vapor activity" in these media.

After a short discussion, Dr. Waterhouse gave a "Metallurgical Review," covering the changes which have occurred in metallurgy, heat treatment, and inspection during the past 30-odd years.

With his wide experience in steel making and his close contact with the industry since he took up teaching, Dr. Waterhouse was able to draw some interesting comparisons.

Sauveur Night Tradition Carried Forward by Mochel

By Adolph O. Schaefer

Philadelphia Chapter—Several years ago on a February evening, the Chapter was fortunate enough to have as its speaker a very famous metallurgist. He spoke for only 29 minutes, but the perfection of his logic and reasoning, the orderly development of his idea, and his charm and clear delivery thoroughly impressed the audience.

Norman Mochel

Philadelphia remembers that talk. It remembers Professor Albert Sauveur for that evening, and for many others like it. It treasures the friendship of the "Dean of American Metallurgists."

In commemoration of that evening and that friendship, Philadelphia's Annual Sauveur Night has come to be the high point of the winter season. The tradition of Sauveur Night has been carried forward in recent years by Messrs. French and Bain.

The Fourth Annual Sauveur Night was held this year on Feb. 26. The 1937 speaker, Norman Mochel, metallurgical engineer of the Westinghouse Electric & Mfg. Co., has a long record of service to the Philadelphia Chapter. He was at one time its chairman, and in other years has served as director and as chairman of the Program Committee. Several years ago he organized a Special Evening Course on "Stainless Steels" which was one of the major successes in the Chapter's history.

Mr. Mochel's talk on "Physical Testing" developed a well-thought-out philosophy of testing rather than a discussion of the details of any one method. Details and methods have received consideration lately in several noteworthy papers and meetings. Perhaps it is time to reconsider our objectives in physical testing, and to choose our tools on an intelligent basis.

Of particular interest in Mr. Mochel's paper were the many instances in which Professor Sauveur pioneered in various testing methods.

The talk ended with a recommendation that we give more serious consideration to non-destructive methods of testing. A lively discussion sprang up, to a large extent revolving about the standards of "cleanliness" which have been developed in Sweden.

This delightful evening was used as an opportunity to entertain the Chapter's 29 sustaining members. Representatives of all but five of these were present as the official guests of the Chapter.

The dinner preceding the meeting was addressed by T. F. Joyce, advertising manager, RCA Victor Mfg. Co., on the "Revival of the Phonograph Business," which has paralleled the miraculous revival in the manufacture of bicycles.

All in all, the Fourth Annual Sauveur Night was a memorable occasion.

Boston Members Are "Heat Treated"

By Arden L. Knight

Boston Chapter — At the annual "Quench and Draw Party" held on Feb. 19 at the Lennox Hotel, 190 members and guests enjoyed a sociable and pleasant evening.

While there was plenty of *quenching medium* present, all *drew their tempers* according to their capacities and not one case of excessive *distortion* as a result of *heat treatment* at the bar was reported during the whole evening.

The dinner of either lobster or steak was excellent and the entertainment was of such a harmless nature that even the "Watch and Ward Society" could not have made any adverse or condemning comments regarding it.

The annual "Quench and Draw" is becoming such an established institution with the Boston Chapter that it has taken on the aspect of Old Home Week or a Homecoming at the old Alma Mater. Harvey Schwartz won the hand-embroidered corkscrew for distance traveled in order to be present. He made the trip from Seattle, Wash.

Next year a little more competition is expected from out-of-town members for this coveted corkscrew prize, since it is rumored that at least one member from Moscow and one from Buenos Aires are planning to be present.

The A B C's of Metallurgy

(with apologies to carbon, nickel and chromium)

By George M. Enos

A stands for light and strong aluminium,
B is for boron; also for beryllium.
C is for copper, an excellent conductor,
D for Duriron, a corrosion resistor.
E lectricity makes many things go,
F begins ferrous, ferric, and ferro.
G is for gold, a metal that's yellow,
H is for hydrogen, a very light fellow.
I ron, of course, is the base of all steel,
J is for junk, I am forced to reveal.
K had me stumped 'till I thought of kalium,
L heavy as lead or as light as lithium.
M is for mercury, manganese, and magnesium,
N othing in common have nitrogen and niobium.
O xy belongs to the famous "-gen" family,
P hosphorus makes steel as brittle as can be.
Q uicksilver, or mercury, already was listed,
R adium rays can hardly be resisted.
S ulphur is in steel, but silver is not,
T stands for tin, it can cry quite a lot.
U of course, must stand for uranium,
V in metallurgy just means vanadium.
W for tungsten, it is often in tools,
X rays should never be used by fools.
Y for Y-alloy is what I think,
Z at the end, of course, stands for zinc.

Compliments

To A.S.M. Assistant Secretary **Ray T. Bayless**, winner of the Sycamore Memorial Trophy Match for 1936, an annual contest for all members of the Sycamore Hill Rifle Club.

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To **Aluminum Co. of America**, whose **R. L. Templin** will be an official representative of the A.S.M. to the Congress of the International Association for Testing Materials to be held in London, April 19 to 24, 1937.

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To **United States Steel Corp.**, whose vice-president, **Charles S. Belsterling**, composed a band selection entitled "March of the Steel Men," which was played by the national champion high school band of Joliet Township at its 24th annual concert.

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To **O. B. McLaughlan**, m.m. of Freeport Sulphur Co., on his speedy recovery from a recent illness in a New Orleans hospital.

-*-

To **Charles H. Shapiro**, chief metallurgist of Reed Roller Bit Co., Houston, and vice-chairman of the new Texas Chapter, on the celebration of his birthday and admission to practice law in the state of Texas on the same day.

-*-

To **George B. Waterhouse**, vice-president A.S.M., on his election as a director of the Dominion Steel & Coal Corp., Ltd. of Montreal.

Machinability Discussed at Ontario Meeting

O. W. Boston Illustrates Talk With Clear Pictures of Tool Forms, Chips and Built-up Nose

By J. W. McBean

Ontario Chapter—The talk on "Machinability of Metals" by Prof. O. W. Boston of the University of Michigan at the March meeting was illustrated by very clear pictures of the tool forms, of the form and behavior of the chips, and of the built-up nose which forms from the material on the tool point.

Professor Boston first discussed the metal being cut. Chemical composition, structure and physical properties of the material as a result of melting practice, fabrication and heat treatment, all have an important bearing on the problem.

Cold-rolled steels containing sulphur allow high cutting speeds with long tool life. For such steels as S.A.E. 3140 and 6140 a slow anneal giving lamellar pearlite is usually the best treatment to secure long tool life. With higher carbon steels such as S.A.E. 1095 this treatment would make the metal too hard and a spheroidizing treatment is better.

The use of lead to improve the machinability of brass is well known and aluminum alloys may have tin, lead, antimony or bismuth added to make them free machining.

Effect of Tool Material

The tool material also has an effect on the results. When carbon steel tools turn steel, or when carbon steel, high speed steel or cemented carbide tools turn cast iron there is abrasion on the flank of the tool below the cutting edge, while with high speed tools turning steel a built-up edge is first formed on top of the tool and the chips flowing over this wear a groove on the tool just behind this edge.

As the cut proceeds, the groove deepens, the force becomes less, the chip comes off more easily, the heat generated is less, and the built-up edge wears away until the groove reaches the point of the tool, and now being thin and weak, it gives way rapidly.

Graphs were shown to illustrate the effect of clearance, rake, side angle, radius of curvature of the tool point, and forces involved. For instance, the cutting speed on S.A.E. 2335 for a given tool life, and the tool life for a given cutting speed, both increase to a maximum for a 22° side rake angle.

The finish on the work is improved when the built-up edge is reduced. It is also improved by grinding with a suitable rake for the material, by increasing the speed and reducing the size of the cut, and by the use of an appropriate cutting fluid.

Bay Bridge Movie Shown

By Ralph A. Thompson

Indianapolis Chapter—At a meeting on March 15, which proved to be the largest and best of the season, the Indianapolis Chapter sponsored the showing of a motion picture entitled "The San Francisco-Oakland Bay Bridge."

This was presented through the courtesy of the United States Steel Corp. and the Carnegie-Illinois Steel Corp.'s Indianapolis office.

C. Earl Webb, American Bridge Co. engineer, gave a very interesting and instructive preliminary talk on the construction of this bridge. This talk, illustrated with slides, proved a great asset in obtaining a vivid and clear understanding of the picture.

Cold Chamber Machines to Die Cast Brass

Other Types of Die Casting Machines, Die Steels and Die Casting Alloys Covered Thoroughly by Sam Tour

By Gordon Sproule

Montreal Chapter—The March meeting touched new heights in that Mrs. G. W. Scott and the ladies of past chairmen graced it with their presence, in honor of Mrs. Sam Tour, who accompanied her husband, the speaker of the evening.

Mr. Tour covered the timely subject of "Die Casting" very thoroughly. Starting with a crude plunger-style machine for casting type, the art has evolved until it now uses high-powered automatic machines and produces castings of brass, and even of pure copper.

Plunger type "hot chamber" machines are used for tin, lead and zinc-base alloys. Aluminum alloys attack cylinders and pistons at the higher working temperature required, and are therefore cast by the air-pressure type of hot-chamber machines.

Brass is cast by the "cold-chamber" process since cylinders would not long stand the fluid temperature, nor could air supply the necessary pressure. The correct amount of alloy at a carefully regulated temperature in the liquidus-solidus range is transferred to the cylinder of the casting machine, and is immediately forced into the die by very high pressure, which reaches 5000 psi. in the hydraulic cylinder, and 25,000 psi. in the die chamber.

Venting Is Important

The venting of die cavities is very important; a vent 0.007 in. wide will permit the escape of air, but will chill molten metal. The die must be gated so that the air will be expelled ahead of the metal.

Many die castings are made in two operations, and even more common is the making of die castings with inserts, such as graphite bronze bearings, magnetic pole pieces in magneto frames, strong alloy studs or nuts, and hardened parts, such as skate blades.

Curved and irregular passages which cannot be die-cored are made by tubular inserts.

On the improvement in die steels has rested the development of the process, no less than on the machines themselves.

Dies for the lower-melting alloys have very good life, as many as 100,000 zinc-base castings being produced from a die.

Improved Die Steels

Some of the factors determining the suitability of a die steel are machinability, stability, retention of properties at operating temperature, resistance to thermal shock (toughness and hot toughness), resistance to attack by the molten alloys, cleanliness and uniformity, reasonable cost.

Two typical improved types are *(a)* Cr 5%, W 1%, Mo 1.5%, C 0.30%, and *(b)* Cr 5%, W 5%, Co 0.5%, C 0.30%.

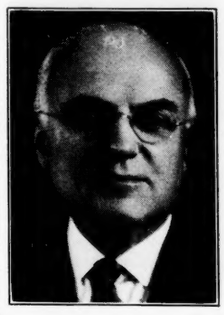
As to the die-casting alloys, lead-base alloys are used for type, chemical equipment, novelties and cheap bearings, and hardened tin is used for high grade bearings.

For structural purposes zinc-base and aluminum-base alloys provide much better strength. In the zinc-base alloys, hardened with aluminum, great improvements have been made. The expansion and disintegration to which these alloys are subject can be eliminated by using zinc 99.99 + % pure, and containing negligible traces of lead and tin. A typical zinc-base alloy contains 4% Al, 3% Cu and 0.05% Mg.

In the aluminum-base alloys copper and silicon are the chief hardening elements, and are used together or singly.

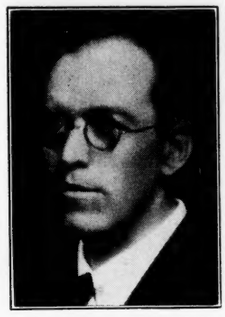
In answer to questions, Mr. Tour elaborated on the precision feature of die casting. With tapered dowel pins, die parts are matched to 0.0005 in. or to 0.003 or 0.004 in. with straight pins.

Death Takes Five A. S. M. Members



R. S. Hirst

Charles Wesley, Sr.



George Batty

RALSTON SANFORD HIRST, for eight years secretary-treasurer of the Golden Gate Chapter, A.S.M., died March 14 at his home in Berkeley, Calif.

Born in New York 64 years ago, Mr. Hirst was graduated from the Philadelphia College of Pharmacy in 1903.

He was chemist at the Camden and Philadelphia Soap Co. for many years before coming to California in 1917 to erect a sugar of milk plant for Smith-Kline and French Co. For the past 12 years he has been chemist for Hall-Scott Motor Co. of Berkeley.

† † †

CHARLES WESLEY, SR., president of the Wesley Steel Treating Co., died at his home in Milwaukee on March 3 after a short illness.

Mr. Wesley, who was 71, was born in Czechoslovakia. He became a blacksmith after a common school education.

He came to America in 1886 and for 18 years had charge of the heat treating department of the A. O. Smith Corp. It was while with this company that the first units of the now famous Ford car were heat treated in that plant.

In 1915 Mr. Wesley went into business for himself, starting the plant which has since grown from a capitalization of $6,000 to $100,000 and from two employees to 78.

Mr. Wesley, in cooperation with his son, CHARLES I. WESLEY, both members of the A.S.M., introduced many unusual things at his plant, where he daily donned a pair of old blue overalls and personally supervised the installation of the newest in heat treating equipment.

GEORGE BATTY, consultant on steel castings and long-time member of the A.S.M. Metals Handbook Committee on Melting, died March 20 in Drexel Hill, Pa., a suburb of Philadelphia.

Mr. Batty received his technical education at Sheffield Scientific School in England and held various positions in the steel plants in that district before coming to the States in 1920. Here he became associated with F. A. Melmoth in work on steel castings, but went back to Great Britain for a short time as technical director of the National Steel Foundry in Scotland.

After his return he was for a long time research director of the Steel Castings Development Bureau in Philadelphia.

† † †

WILLIAM C. CHANCELLOR, also a member of the Metals Handbook Committee, died March 24 in Cleveland, following an operation. He was assistant general superintendent of the National Tube Co. at Lorain, Ohio.

† † †

THOMAS VINCENT BLODGETT, long-time member of the Lehigh Valley Chapter A.S.M., died March 28 of complications following an operation for appendicitis.

Mr. Blodgett, who was 46 years old, had been sales manager for Lebanon Steel Foundry since 1925, and at the time of his death was about to be promoted as vice-president in charge of sales. He had been with Lebanon since 1920, having worked for Bethlehem Steel Co. prior to that time.

Conradi Presents Course At Southern Tier

Through the courtesy of the Educational Department of the International Business Machines Corp. and the National Office of the American Society for Metals, the Southern Tier Chapter has been able to present a lecture course on "Principles of Heat Treatment."

The series is given at the School Building of the International Business Machines Corp. by L. C. Conradi, technical research director. Mr. Conradi has taken as the background for his lectures Dr. Grossmann's book on "The Principles of Heat Treatment."

Registration at the first lecture on March 29 was over 250 — so much higher than anticipated that it was necessary to divide the course in two classes, meeting on separate evenings.

Diffraction Methods Used to Investigate Fatigue Failures

By Merrill A. Scheil

Milwaukee Chapter — Guest coffee speaker on Feb. 25 was Ralph Piper of the Physical Education Department, University of Minnesota, who presented play-by-play comments and a movie film showing Minnesota's great football team in action.

The evening's technical program was supplied by E. W. Page and Dr. Reynolds of the General Electric X-Ray Corp., who discussed the advantages of diffraction and X-ray methods in the examination of metals.

After a brief discussion of radiography used to reveal hidden defects, Mr. Page dealt at length with diffraction methods to determine the fine structure of metals.

Among the excellent examples illustrating this type of investigation were the results of studies upon materials which had failed in service by fatigue because of the difference between surface and interior structure.

Aluminum die castings for automobile horn bodies showed by a diffraction pattern that the surface skin was in a condition of high strain, causing rapid fatigue.

An interesting topic was the investigation of chromium magnet steels. Four heat treated bars from the same heat of steel showed that one developed the best magnetic properties when the diffraction pattern was entirely alpha iron.

One bar was worthless as a permanent magnet and showed an overheated pattern with chromium and carbon precipitated as carbides. Two bars showed intermediate properties with slight precipitation of carbide.

Quantitative analysis of chemical compounds is an especially fertile field at present. In test bars of zinc die castings which varied 180% in their mechanical properties, the diffraction patterns obtained from three positions along the gage length showed that the normal chemical properties of 2.5% Cu, 4.0% Al were about the same but the percentage composition of the compounds varied considerably.

Bain & Eisenman Regale Los Angeles Chapter With Varied Subjects

By Louie W. Mosley

Los Angeles Chapter—The meeting on March 4 was the best attended of any this year, featuring "President's Night" in honor of Dr. E. C. Bain, president of the Society, and W. H. Eisenman, secretary.

Some 200 were present after the dinner, when Dr. Bain was introduced by Chairman D. S. Clark. Dr. Bain made a few facetious remarks about his traveling secretary, Mr. Eisenman, and also thanked the local weather committee for having exhibited a good sample of Southern California weather.

Mr. Eisenman then grasped the opportunity to tell of the joys of traveling with the President, and his remarks were received with effusive applause.

Western Congress Planned

He also spoke of the tentative plans for a Western Metal Congress in Los Angeles in 1938, and found some pretext for injecting a description of his experiences, credible and otherwise, in managing his Ohio sow farm.

He briefly outlined the financial structure of the Society, and explained its sources of income and its services to members.

The remainder of the evening was given over to Dr. Bain and his celebrated lecture, "The Apparent Anomalies in the Hardening of Steel," with which he mixed several good Scotch stories.

Transformation Movies Explained

In the discussion which followed, Dr. Bain explained the "interrupted motion pictures" of metal structure transformations shown in the course of his lecture.

The question was asked by Prof. Clapp of the California Institute of Technology whether there was any difference in the spread of variation of physical property values due to grain size. Dr Bain stated that while fundamentally there probably is not such a correlation, fine-grained steels can often be abused in heat treatment without reflecting the variation in conditions as much as would be the case with coarse-grained steels. Composition, he said, is held now to about as close limits as the nature of the steel making processes permits.

The climax to the discussion was Mr. Eisenman's deep and learned explanation of a curious metallurgical phenomenon, freely punctuated with pompous (and meaningless) words which referred to anything but metallurgy, but which threw the house into a hilarious uproar.

HERE AND THERE WITH A.S.M. MEMBERS

ON April 16 ELMER GAMMETER, vice-chairman, Chicago Chapter A.S.M., joined the Alloy Division, Metallurgical Department, Carnegie-Illinois Steel Corp., Chicago.

For the past six years Mr. Gammeter has been metallurgist for the Edison General Electric Appliance Co. During this time he has been largely specializing in welding and fabricating of stainless steel and heat resisting alloys.

Previous to this he was metallurgist with the Western Electric Co. and The Midvale Co.

* * *

JAMES ALLISON, past chairman of the Hartford Chapter A.S.M., co-author of an article on magnetic testing in the A.S.M. Metals Handbook, and president of the Hartford Engineers' Club, has recently become factory manager of The Billings & Spencer Co. He was formerly field service metallurgist for the Union Drawn Steel Co. in the New York and New England area.

Mr. Allison holds an A.B. degree from Princeton University and a B.S. in metallurgical engineering from Carnegie Institute of Technology.

He has served as plant metallurgist in the Hartford plant of Union Drawn Steel Co., worked in the open-hearth department of the Crucible Steel Co., in the finishing mills of the Jones & Laughlin Steel Corp., and for American Bridge Co. and Mesta Machine Co.

* * *

ANNOUNCEMENT has been made of the appointment of J. C. JOUBLANC as chief metallurgist for the Harnischfeger Corp. of Milwaukee.

Mr. Joublanc is well known in metallurgical and welding research circles. For ten years he was connected with Republic Steel Corp., and for four years with the welding development and research department of one of the country's leading welding equipment manufacturers.

* * *

NORMAN PAQUIN, who resigned as vice-chairman of the Cincinnati Chapter two years ago, when he went to Shelby, Ohio, to become mechanical engineer for Ohio Seamless Tube Co., has now moved to Cleveland, where he is research engineer for the Weatherhead Co.

W. L. Weaver, New Stainless Sales Manager for Ludlum

J. P. Morrissey, Head of Weld Rod Sales for Harnischfeger

WILLIAM L. WEAVER, Buffalo Chapter A.S.M., has been appointed manager of stainless castings sales for Ludlum Steel Co., Watervliet, N. Y.

Mr. Weaver has been with Ludlum for the past 20 years as salesman, district sales manager for upper New York State, and more recently with the home office at Watervliet, doing sales work of a development nature.

* * *

AT the annual organization meeting of The Billings & Spencer Co. in February, W. A. PURTELL was elected president.

Mr. Purtell is also president of The Holo-Krome Screw Corp. of Hartford, and will continue in this capacity. He has been active in the management of The Billings & Spencer Co. for several months as director and as chairman of the Management Committee.

NEW head of the Weld Rod Sales Division of The Harnischfeger Corp. of Milwaukee is J. P. MORRISSEY, a man who attained nation-wide recognition with his interesting article in the *Saturday Evening Post* on his experiences as technical welding adviser for the Russian Government in 1930.

In this article, he tells of his appointment by the Amtorg Co. and his subsequent disillusionment upon discovering that the Soviet Government and workers are men of few words, most of which are *Netcheda*—it doesn't matter—and *Zaftra*—tomorrow.

Besides his experience in Russia his former connections also include six years as special representative on weld rods with the Crucible Steel Co. of America and some time with the Fusion Welding Corp. as Philadelphia district manager.

THE many friends of RALPH L. MANIER, industrial heat engineer for the Syracuse Lighting Co., Inc., Syracuse, N. Y., will be glad to learn of his recent appointment to the Central Division Staff of the Niagara Hudson Power Co., for coordinating all promotional activities in commercial and industrial heating and air conditioning sales.

Mr. Manier is a graduate of Rensselaer Polytechnic Institute and has been with Syracuse Lighting Co. since 1920.

Long active in committee work for the American Gas Association, he was advanced this year to chairman of the Industrial Gas Section. In 1929-30 he served as chairman of the Syracuse Chapter of the American Society for Metals.

His successor at Syracuse Lighting Co. is S. W. FRENCH, also a past chairman of the Syracuse Chapter.

* * *

STARTING with summer vacations during his college days, ALFRED E. GIBSON has been employed by the Wellman Engineering Co., Cleveland, continuously for 30 years, with the exception of two years, from 1926 to 1928, when he was vice-president and president of Fulton Foundry and Machine Co., Cleveland.

Serving successively since 1928 as works manager, vice-president and assistant general manager and executive vice-president, he has now been elected president.

Mr. Gibson, who is an authority on the development and application of low alloy steels in welded construction, is president of the American Welding Society and a member of the A.S.M., the A.I.M.E., the Iron and Steel Engineers, and the International Acetylene Association.

* * *

CLAUDE L. ROTH, member of the Executive Committee and chairman of the Constitution & By-Laws Committee, Philadelphia Chapter, has formed a partnership for the general practice of law under the name of Moffett & Roth, with offices at 1608 Walnut St., Philadelphia.

Coated Rods Are A Large Factor in Welding Advancement

By E. V. Peterson

North West Chapter — A lecture on Electric Welding by James F. Lincoln, president, Lincoln Electric Co., Cleveland, drew the largest crowd of the season on March 9.

The cellulose-covered type of rod has been a big factor in the advancement of welding. Uncoated rods leave the molten weld metal in contact with oxygen and nitrogen of the air. Gas pick-up occurs and the weld metal is consequently low in strength and ductility.

The coated rods form reducing gases and slags which prevent access of air, and as a result the deposited metal has physicals equaling, or even exceeding, those of the parent metal.

This improvement in the properties of the weld metal has led to the replacement of numerous castings with welded structures.

The speaker emphasized that suitable designs, although they might seem unconventional in appearance, led to a saving in weight and total cost. In designing the welded structure, the analysis should be based on the stress requirements and not on the appearance of the casting it is to replace.

Auto Consists of 12 to 14% Cast Iron By Weight Says Austin at Detroit

By Howard E. DeHaven

Detroit Chapter — A sprinkling of foundrymen met with the Chapter when Harold S. Austin presented his paper on "Automotive Cast Iron" before the ferrous section on Feb. 8.

As foundry metallurgist for the Buick Motor Co. at Flint, Mr. Austin was able to draw upon a wide background of experience from which he gave intimate details of many phases of his subject.

He stated that the automobile consists of from 12 to 14% cast iron by weight and that the trend is toward a wider use of this metal.

Gray cast iron is the most complex of all the ferrous metals. In a detailed description of the structural compositions of the several grades of iron, it was disclosed that automotive cast iron of hypo-eutectic structure is the most commonly used.

While steel is stronger in tensile and impact value, some of the chief advantages of cast iron are price, adaptability to complicated designs, thin sections, fluidity, resistance to wear, and ability to be cast to specified size, resulting in a minimum amount of machining.

Refractories Warrant Study

Cast iron is produced in cupolas, air furnaces, electric furnaces, or other special furnaces. The heavy tonnages melted at the present day, ranging in temperature from 2800 to 2950° F. impose severe conditions on refractories. This phase of the subject is worthy of consideration by the refractory engineer.

The physical and structural properties of cast iron can be altered by the rate of cooling to such an extent that the iron may be entirely unsuitable for the purpose intended. On the other hand, this very same characteristic may be used to advantage in chilled parts where great hardness is desired.

Automotive cast iron may be divided into six general classes: *(a)* Cylinder iron, close grained and wear resistant, *(b)* small parts iron, softer and more open grained, *(c)* piston ring iron, *(d)* heat and growth resistant iron, *(e)* high test gray iron, and *(f)* special compositions for specific purposes.

Good Base Iron Necessary

Included among the special applications discussed were the cast iron camshaft with chilled or air-quenched cams, composite brake drums consisting of an outside shell of steel with a fused braking surface of cast iron, cylinder liners and valve seat inserts.

In discussing the influence of alloys on physical properties, Mr. Austin pointed out the necessity of a good base iron to start with, since the addition of alloys is not a cure-all.

National Officers Draw Capacity Audience at Frisco

By C. W. Horack

Golden Gate Chapter met at the Engineers Club in San Francisco on Feb. 19 to honor two of the national officers of the Society—President E. C. Bain, and Secretary Wm. H. Eisenman.

The prominence of these men in the affairs of the Society and the message they had to bring to this Chapter brought forth a capacity audience of some 200 members and guests.

After a good dinner Mr. Eisenman was introduced by Roy E. Paine, of the Aluminum Co. of America. After a few humorous remarks, Mr. Eisenman gave a brief survey of the purpose of their trip to the West Coast, which included the installation of the officers of several new Chapters.

The main speaker of the evening, Dr. E. C. Bain, was then introduced by Frank Drake, president of the Johnson Gear Works. Dr. Bain gave a very interesting and enlightening talk on what he called the "Apparent Anomalies of the Hardening of Steels."

Low Alloys Raise Tensility and Ductility

By F. J. Comerford

Rochester Chapter—One of the finest turn-outs of the year greeted President Bain on Feb. 8 to hear his talk before the Rochester Chapter and the Superintendents' Group of the Rochester Chamber of Commerce on "Low Alloy Structural Steels."

By means of a series of well-prepared slides President Bain explained the advantages of small alloy additions to various steels, citing such materials as Cor-Ten and Man-Ten.

He explained that while it is possible to obtain a higher tensile strength by an increase in carbon, this is accomplished with a loss of ductility. The addition of small amounts of alloys such as chromium and copper not only gives an increased tensility but also increases the ductility.

At this point President Bain turned the meeting over to A. F. Stuebing, railroad mechanical engineer, United States Steel Corp., who showed by means of slides how the railroads, bus lines and other means of commercial transportation have taken advantage of these new types of low alloy steels to reduce weight in new designs of equipment.

Both President Bain and Mr. Stuebing were called upon to answer many questions.

Free Literature — Mail Coupon Below

Galvanizing
An informative, historical, simple digest of galvanizing forms a guide to longer life for iron and steel products. This handsome, handy, 24-page book beautifully printed in color is distributed by American Hot Dip Galvanizers Association, Inc. Bulletin Ea-167.

Air Heaters
Diagrams, illustrations and detailed text in a folder by General Combustion Corp. give a very clear conception of the construction and applications of General air heaters. Bulletin Ea-166.

Salt Bath
"Heating from the inside out" is what makes the Ajax-Hultgren salt bath furnace practical. Ajax Electric Co. explains this new operating principle in an interesting folder. Bulletin Oy-43.

Springs Handbook
An excellent presentation is combined with complete technical information in a handsome 88-page book on the art and science of spring making. Illustrations are particularly handsome and well chosen. Published by Barnes-Gibson-Raymond. Bulletin Da-162.

Copper Bulletin
A new clearing house for news of developments in brass, bronze and copper, the "Copper Alloy Bulletin," issued by the Bridgeport Brass Co., made its appearance with the March issue. It is edited for the technical and engineering audience. Bulletin Da-163.

Riveting Aluminum
The riveting of aluminum and its alloys is treated from all angles in a comprehensive little booklet by the Aluminum Co. of America. Materials, types, riveting practice for various applications, and properties of the riveted joint are covered. Bulletin Da-54.

Wheelco Data Book
Complete information on the radio principle, the Limitrol, Flame-otrol, and the complete line of Wheelco pyrometers and accessories is contained in a data book on temperature indicating and control. Bulletin Da-110.

Tag Controllers
Of interest to many readers will be the new catalog by C. J. Tagliabue Mfg. Co. completely describing and illustrating the latest models of Tag non-indicating controllers for temperature, pressure and time. Bulletin Da-62.

Pot Furnaces
Pot furnaces for hardening, tempering and forging are described by Surface Combustion Corp. by means of illustrations and complete data concerning an existing installation. The folder also tells about Surface Combustion air heaters. Bulletin Da-51.

Architectural Stainless
Presented in an unusually attractive format, the United States Steel subsidiaries have recently issued a catalog on stainless steel in architecture, which contains facts, photographs and drawings specially prepared for the architect and his fabricator. Bulletin Da-79.

Automotive Steels
International Nickel Co.'s bulletin on automotive uses of nickel alloy steels should be of value to all metallurgists and designing engineers in suggesting steel compositions to meet present-day requirements for strength, toughness and dependability. Bulletin Da-45.

Toolmakers' Microscope
Only recently have optical methods of measuring and testing been introduced in the workshop. These methods — particularly adapted to measuring small and intricate parts — and the equipment used are fully described in a booklet by E. Leitz, Inc. Bulletin Da-47.

Voltmeters
The improved voltmeters and ammeters illustrated, diagrammed and described in Bristol's 23-page catalog embody all of the desirable features developed during 45 years experience, plus new features to meet the more rigid requirements of today. Bulletin Da-87.

Mesh Products
Wire mesh is a class of material about which little is heard. A folder by C. O. Jelliff, therefore, telling the special alloys and metals used, styles of weaves and applications is of unique interest. Bulletin Da-78.

Small Furnaces
American Electric Furnace Co. makes a line of small cylindrical pot furnaces for lead, salt and cyanide that are particularly adapted for the multitude of odd jobs found in manufacturing plants processing metals. Described in Bulletin Da-2.

Insulation Service
"Barriers to industrial waste" is what Johns-Manville calls insulating materials. A small 64-page booklet catalogs their complete line, which contains a product for every temperature. Bulletin Da-100.

Welding Pipe Lines
An improved welding method used in the construction of over 5000 miles of cross-country pipe lines is discussed in a 32-page illustrated booklet published by The Linde Air Products Co. Bulletin Da-63.

Fast-Cutting Steel
Bliss & Laughlin, Inc., offer an interesting technical folder on Ultra-Cut Steel, giving performance records of this high-speed screw stock on automatic screw machines. Physical data and microstructures are presented. Bulletin Ob-42.

Turbo-Compressors
Spencer Turbine Co. has turbo-compressors in all sizes and types for oil and gas-fired furnaces, ovens and foundry cupolas. Special types for special purposes such as gas-tight and corrosion resisting applications are also described in Bulletin Da-70.

N and Mo in Stainless
A valuable addition to any metallurgist's library is a set of tables giving physical properties of high-nitrogen chromium and chromium-nickel steels and columbium-bearing chromium-nickel steels. Electro Metallurgical Co. Bulletin Da-16.

Spectrum Analysis
The elements of both qualitative and quantitative spectrum analysis are contained in a handy booklet by Carl Zeiss, Inc. A price list covering all equipment is included. Bulletin Da-28.

Meehanite
A compact but complete specification chart gives the recommended grades of Meehanite metal for various service requirements. Complete physical properties and applications are included. Bulletin Da-165.

Heading and Upsetting
A multitude of unusual parts, beautifully photographed and displayed in a folder by Lamson & Sessions Co., can now be produced by heading or upsetting to close tolerances and with an entirely satisfactory finish. The advantages of bolt-making methods are explained. Bulletin Da-164.

Metals for Corrosion
Fourteen varieties of Midvaloy corrosion and heat resisting metals are described in a detailed bulletin by the Midvale Co. Properties and applications are listed and illustrated. Bulletin Ca-160.

Oven Furnaces
In a nutshell American Gas Furnace Co.'s improved oven furnaces offer controlled atmosphere, quiet operation, economy, are over and under-fired and bottom vented. Described more fully in Bulletin Aa-11.

Magnet Steels
A very handsome booklet describes the permanent magnet steels and castings made by Simonds Saw & Steel Co., including Alnico and Alnic. Bulletin Ba-158.

Copper Welding Rods
American Brass Co. describes in complete detail the welding properties and individual characteristics of 14 different copper alloy welding rods. The 16-page booklet also makes specific recommendations of welding procedure. Bulletin Je-89.

Tool Steel Selector
A wall chart, 30 x 20 in., to be used as a means for selecting the proper type of tool steel is offered by Carpenter Steel Co. to tool steel users in the U.S.A. only. Bulletin Jz-62.

Grain Size Measure
Classification of steels by grain size has become such an important laboratory procedure that Bausch & Lomb Optical Co., at the suggestion of Dr. Marcus A. Grossmann, has developed a grain size measuring eyepiece for microscopes which makes the determination a simple, routine matter. Described in Bulletin Ox-35.

Aerocase
A modern method for case hardening and heat treating steel in a liquid bath is provided by the use of Aerocase compounds, which have been in commercial use for more than six years. Their principal features are described by American Cyanamid and Chemical Corp. in an interesting booklet. Bulletin Oy-148.

Optical Pyro
No correction charts, accessories, nor upkeep are required with the Pyro optical pyrometer, which is a totally self-contained direct-reading precision instrument made by Pyrometer Instrument Co., and described in Bulletin Ay-37.

Hydraulic Tester
Of interest to all engineers recommending or purchasing universal testing machines is a book by Riehle Division of American Machine and Metals, Inc., on the development of the precision hydraulic testing machine. Bulletin Ba-157.

Globar Elements
Globar electrical heating units and a variety of accessories for their operation have been catalogued by Globar Division of Carborundum Co. Bulletin Oy-25.

New Joining Process
Metal parts are joined cheaply, neatly and strongly by Electric Furnace Co.'s new, inexpensive non-oxidizing furnace atmosphere and their new, continuous brazing, coppering and soldering furnaces. Full details are given in Bulletin Ar-30.

Light Case
Severe breakdown tests were run by A. F. Holden Co. to study the characteristics of Holden Light Case in relation to case penetration and the total change of chemistry of the bath. They are described, and a chart showing results is reproduced, in a folder ready for distribution. Bulletin Dy-55.

Hardening Furnaces
P. D. M. high speed hardening furnaces are described in two bulletins by The Philadelphia Drying Machine Co. — one devoted to oil-fired and one to gas-fired furnaces, both made in single and twin chamber models. Details of construction, design features and tables of sizes and capacities are included. Bulletin Oy-150.

Fine Steels
Compiled by men who make fine steels to assist men who use fine steels, a handy, pocket size, 150-page volume by Ludlum Steel Co. contains many new, helpful charts and tables, all made quickly available by a unique method of indexing. Bulletin Aa-94.

Alloy Castings
Michiana Products Corp. has published a new book describing Michiana corrosion resistant and stainless steel alloys. Generously illustrated, it suggests many savings for the use of these alloys. Bulletin Oy-81.

X-Ray Examination
The application of X-ray examination and inspection to castings, welding, and food products, as well as practical X-ray crystal analysis, is completely described and strikingly illustrated in General Electric X-Ray Corp.'s new 34-page publication. Bulletin Dy-6.

Airless Cleaning
Comprehensive coverage of abrasive cleaning and preparation methods by description and illustrations is contained in a colorful book published by the American Foundry Equipment Co. It describes the airless abrasive cleaning and preparation method known as "Wheelabrating." Bulletin Dx-112.

Modern Controls
In view of the present trend toward modernization in industry, Brown Instrument Co. points out the important part played by temperature measurement and control instruments in facilitating operation of efficient equipment for oil refining, steel treatment, chemical, textile, ceramics and other industrial processes Bulletin Sy-3.

Molybdenum
Climax Molybdenum Co. presents their annual book giving new developments in molybdenum, particularly as an alloy with iron and steel. The engineering data presented are made clear by many tables and illustrations. Bulletin Dc-4.

Stainless Data Book
All users of stainless and heat resisting alloys should find invaluable the information contained in a booklet published by Maurath, Inc. giving complete analyses of the alloys produced by the different manufacturers, along with the proper electrodes for welding each of them. Bulletin Jy-125.

Liquitol
The use of Liquitol for controlled cooling of iron and steel castings and ingots is fully described in a bulletin by Alpha-Lux Co., Inc. Bulletin Ma-120.

Stress-Strain Recorder
The many applications of the Baldwin-Southwark stress-strain recorder, its unique advantages, and the many ways it can give unusual service will be extremely interesting to all who have to do with testing methods and equipment. Bulletin Ba-67.

Electrodes
Recommended welding procedures for the new "Shield-Arc 100" electrode as well as all other Lincoln electrodes are contained in the latest "Supplies Bulletin" published by Lincoln Electric Co. Bulletin Ba-10.

Cleaning Processes
An attractive 12-page booklet entitled "Scientific Metal Cleaning" has been published by Detroit Rex Products Co. It describes in detail the applications and advantages of Detrex degreasing with Perm-A-Clor or Triad Safety Solvents and the applications of Triad Alkali Cleaning Compounds and Strippers. Bulletin Oy-111.

Stabilog
Ten outstanding advantages of the potentiometer Stabilog are fully explained in an attractively laid-out folder by the Foxboro Co. Bulletin Ba-21.

Nickel Silver
Riverside Metal Co. has just published a beautiful booklet on nickel silver. If you want the latest information on this subject, presented in an attractive, interesting manner, write for Bulletin Aa-156.

Sicromo
Timken Steel & Tube Co. has issued a new booklet on Sicromo steels which gives analyses of these new steels and discusses the effect of both silicon and chromium on oxidation resistance. Bulletin Ba-71.

Laboratory Service
A new edition of "The Metal Analyst" tells about an organization established by Adolph I. Buehler specializing in the installation of metallurgical laboratories. The complete line of laboratory equipment marketed by Buehler is also catalogued. Bulletin Dy-135.

Nickel-Copper Steels
Exceptional resistance to corrosion and abrasion, increased tensile strength, and higher ductility are the qualities claimed for Youngstown Sheet & Tube Co.'s new series of Yoloy steels. A summary of properties and notes on their characteristics are contained in Bulletin Ox-93.

Heat Resisting Alloys
Authoritative information on alloy castings, especially the chromium-nickel and straight chromium alloys manufactured by General Alloys Co. to resist corrosion and high temperatures, is contained in Bulletin D-17.

Heat Treating Manual
A folder of Chicago Flexible Shaft Co. contains conveniently arranged information on heat treating equipment for schools, laboratories and shops, and also illustrates the several types of Stewart industrial furnaces. Bulletin Ar-49.

Newer Tool Steels
Vulcan Crucible Steel Co. has a complete and attractive catalog listing their full line of tool steels including many special types to meet the modern trends in industry. Bulletin Jy-127.

Testing with Monotron
Shore Instrument & Mfg. Co. offers a new bulletin on Monotron hardness testing machines which function quickly and accurately under all conditions of practice. Bulletin Je-33.

Corrugated Ingots
The Gathmann Engineering Co. has published a new booklet called "Gathmann Ingot Molds — Their Purpose and Design." It illustrates various corrugated ingot contours designed to produce defect-free surface in steel ingots. Bulletin Ay-13.

Port Valves
Diagrams and descriptive matter show the operation of adjustable port valves made by North American Mfg. Co. that are particularly suitable for mediums whose rate of flow is not constant. Bulletin Oy-138.

Castable Refractory
Properties, method of use, and applications of "Cast-Refract," a time and labor-saving castable refractory made by the Quigley Co. are given in Bulletin Oy-139.

Photo-Electric Cells
If you are not familiar with the wide field of applications for photo-electric cells and apparatus, send for this very interesting and complete booklet by Pfaltz & Bauer, Inc. covering the original apparatus developed by Dr. Bruno Lange. Bulletin Ca-142.

Metal Working
Concise but informative is a little booklet by E. F. Houghton & Co. describing various metal-working products—rust preventatives, cutting oils, metal cleaners, quenching oils, carburizers, pickling inhibitors, and miscellaneous products. Bulletin Ca-38.

Cast Vanadium Steel
Jerome Strauss and George L. Norris have written a technical booklet for Vanadium Corp. of America describing the properties developed by steel castings containing various percentages of vanadium. The information given is complete and authoritative. Bulletin S-27.

Micromax Model
A novel publication by Leeds & Northrup Co. has the effect of almost putting a half-size model of the Silver Anniversary Micromax recorder in your hands. Cut to the actual shape of the recorder, it can be opened out and the whole mechanism swung into place. Bulletin Ca-46.

Resistance Wire
A complete catalog of the various types of electric resistance wires made by the Hoskins Mfg. Co. has been issued. Complete numerical data are included on all types, along with some fundamental facts about heating units. A handy small size 48-page booklet. Bulletin Jy-24.

Centrifugal Castings
Centrifugal casting of stainless, heat and corrosion resisting alloys eliminates impurities and cooling strains and permits thinner and more uniform walls than any other method. This is explained in a bulletin by Michigan Steel Casting Co. Bulletin Nx-84.

Cleaning Rooms
A catalog of designs for blast cleaning rooms incorporating many labor and time saving improvements making the blast room an unequalled mechanical device for low cost cleaning is published by Pangborn Corporation. Bulletin Ca-6.

Ni-Cr Castings
Compositions, properties, and uses of the high nickel-chromium castings made by The Electro Alloys Co. for heat, corrosion and abrasion resistance are concisely stated in a handy illustrated booklet. Bulletin Fx-32.

Die Blocks
A handy, small size spiral-bound leather note book is a complete handbook on Heppenstall Company's die blocks. Valuable additional data are contained, as well as a few blank pages for memoranda. Bulletin Ca-122.

Gas-Fired Cyclone
Lindberg Steel Treating Co. has announced a gas-fired Cyclone furnace as a companion to the electric Cyclone. Complete data in the form of diagrams, charts, photographs, and blueprints are found in a new catalog. Bulletin Jy-66.

Brinell Tester
Accurate and exact measurements can be made on hard or soft materials with the Diamo Brinell hardness testing machine, which uses a pyramid-shaped diamond instead of a steel ball. Described in a pamphlet by Pittsburgh Instrument and Machine Co. Bulletin Aa-1.

Grinding Lubrication
A handy outline for the selection of grinding wheels is one of the useful features of a booklet full of facts about grinding solutions D. A. Stuart & Co. Bulletin My-118.

Rockwell Tester
A revised and completely up-to-date catalog on the the well-known Rockwell hardness tester is well illustrated and contains 24 pages. Published by Wilson Mechanical Instrument Co., Inc. Bulletin Ca-22.

Diamond Wheels
A striking presentation is made by the Carborundum Co. in a 52-page booklet on diamond wheels. Detailed technical information is contained and a price list attached. Bulletin Ca-57.

4 to 6½ Cr
Fifth of the series of beautifully printed booklets describing Republic Steels Corp.'s Enduro types is concerned with the 4 to 6½ chromium steel. Its particular application to oil refining is described in detail. Bulletin Ca-8.

The Review
7016 Euclid Ave., Cleveland

Please have sent to me without charge or obligation the following literature. Circle the numbers that interest you. It is important to write in your company or business connection when you return this coupon.

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Da-51			Ar-30	Jy-125	D-17	S-27	Ca-22
				Ma-120		Ca-46	Ca-57
							Ca-8

Six Student Groups

The Junior Members' Own Page

772 Junior Members

Lewis Institute Tours Chicago Plant

Metallurgy Classes Visit International Harvester Forge, Machine and Heat Treat Shop.

By Thomas Mika

Lewis Institute, Chicago's metropolitan engineering school, made an extensive tour of the International Harvester Tractor Works during the first week in March.

Professor L. Haga, head of the Department of Metallurgy, conducted his classes of metallurgy, metallography and forge and heat treatment on this tour as a practical application of the theories discussed in class. The forge shop, machine shop and heat treating department were visited.

Highlight of the trip was a practical demonstration of the Tocco or differential hardening process. By rapid quenching from the intense heat generated by an induction current, file hardness is induced to a depth of ⅛ in.

Five-ton drop hammers, flat-die hammers and trimming presses left a din in the ears of the visitors long to be remembered. Bronze giants, accentuated by the glare of the furnaces, demonstrated the principles of flat-die and drop forgings.

Bars, rings, crankshafts, spindles, gear blanks, and die blocks were punched out of divers steels as if so much butter.

In the machine shop were demonstrated the drilling, milling, boring, shaping and broaching of cast and forged tractor parts. The applications of bar-straightening machines, die-sinking equipment and pantograph acetylene torches to casting and forging practices were also demonstrated.

Normalizing, oil and water quenching, and case hardening by carburizing, nitriding and cyaniding were shown in the heat-treating department.

Special Program Planned at M. I. T.

A special Summer School on Strength of Materials will be held at the Massachusetts Institute of Technology for four weeks beginning June 21.

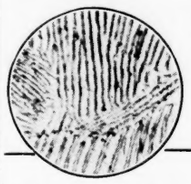
The subject of creep will be presented by A. Nadai and C. R. Soderberg of Westinghouse Electric and Mfg. Co. H. J. Gough, National Physical Laboratory, England, will lecture on fatigue, and members of the Institute staff on strength of materials.

Four Seminars will be held during the course to afford opportunity for the presentation of recent developments in allied fields of engineering mechanics. The course will be concluded by two all-day conferences on fatigue and creep.

The Committee on the Graduate School of the Massachusetts Institute of Technology will allow credit for nine units of advanced study for the satisfactory completion of this summer school program.

Tuition fee will be $80.00. Due to limitation of laboratory facilities, admission to the School will be in order of application. Registrations should be in by June 1.

Further particulars may be had by addressing Prof. John M. Lessells, Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, Mass., who is director of this summer school.



Bob Learns About Hardening

You know, Al, ever since you told me about pearlite I've been wondering about what makes steel hard, but darned if I can find out from this metallurgy book of yours."

"Oh, yeah! Well, it's not quite that simple, I hope."

"But what's so difficult about hardening steel? Don't you do it just by heating it — or something?"

Sure, Bob, you do it by heating it, but you can make steel soft by heating it too. So what?"

"So what — that's just what I'd like to know. What's the difference between heating steel to harden it and heating steel to soften it?"

"Well, it isn't really the heating that does the trick, but rather the cooling."

"That's funny. Well, then, how do you cool it?"

"The more slowly you cool it the softer it is, and the faster you cool it the harder it is. Rapid cooling — fast enough to harden the steel — is generally known as quenching because the steel is usually dipped in water, oil or a salt solution."

"How do you cool it to make it soft then?"

"Either in air, or the steel is left in the furnace, the heat turned off, and the furnace and parts being heat treated are allowed to cool together to room temperature."

"But why is it that the steel is hard when it's cooled quickly and soft when it's cooled slowly?"

"I was afraid you'd ask me that. Now I'll have to tell you all about austenite, martensite, troostite and sorbite."

"I suppose those are more 'thumbprints.'"

"They are the names of structures in steel, like pearlite, but they don't look like thumbprints."

"Do you have some pictures of them in this book?"

"Yes, but here's a better idea. Some afternoon about four o'clock you come over to the lab with me and I'll let you look at them through the microscope. Then I can explain it a lot easier too."

"Okay, but don't try to put me off, because I'll pester you until you do take me over there."

Ann Arbor Group Hears Talk on Industrial Field

By C. A. Siebert

University of Michigan Group—R. L. Wilson, metallurgist, Timken Steel and Tube Division, and trustee of the Society, gave a talk before the student metallurgical group at the University of Michigan on March 25. His subject was "The Metallurgical Engineering Graduate and Industry."

Mr. Wilson outlined the various fields of metallurgical activity now existing in the steel industry and advised the students to choose the one which interested them most. The fields considered were research, production, service and sales.

Mr. Wilson emphasized the importance of factors other than a knowledge of engineering, pointing out that the ability to cooperate is often the deciding factor between success and failure.

Why Stainless Steel Is Stainless— Peterka Wins $5 Prize for Best Answer

First prize of $5.00 for the best answer to the question "Why is stainless steel stainless?" has been awarded to A. E. R. Peterka, technical assistant to the vice-president, The Lamson & Sessions Co., Cleveland. Honorable mention goes also to A. W. Grosvenor, Drexel Institute, Philadelphia, and to Charles E. Balleisen, also of Philadelphia. Mr. Peterka's prize-winning answer follows.

In the first place, technically, there is no such thing as a stainless steel which is absolutely 100% stainless. There are different grades of stainless steel, and under conditions of high temperature or when in contact with certain acids or fumes these stainless steels will stain or corrode in varying degree.

We call stainless steel by that name because under atmospheric conditions it retains its bright, metallic luster. Nevertheless, even this stainless steel will corrode, and it is because it does corrode that it is stainless. However, it is the nature of the "rust" coating that keeps it stainless.

Digressing for a moment from stainless steel to common iron, we know that this material is not stainless. It rusts very readily, and when we say "rusts," we simply say "corrode" by another term.

When iron corrodes, rust is formed upon its surface, and from experience we all know that you can rub your finger over the rust and it readily comes off. In other words, the corrosion or rusting of ordinary iron is progressive. The coating of rust on ordinary iron does not protect the material beneath it from further rusting because of the porous condition of the coating of rust which permits corrosive agents to pass through it and attack the iron beneath it.

Now let us take ordinary iron and add just one-fourth of 1% of copper to it. This iron will also rust or corrode, but with a very marked difference. We find that although this copper-bearing iron will rust, the nature of the rust coating is different. By comparison it is hard and dense. In fact, it is so dense that after a certain amount of it has formed on the surface no further rusting takes place.

In other words, the rusting is not progressive, and in this case the coat-

(Continued on page 8)

Why Are Alloys Added to Steel?—$10.00 in Prizes

THE REVIEW will pay $5.00 for the best answer to this question submitted by a member of the American Society for Metals, $3.00 for the next best answer and $2.00 for the third best.

Answers should be less than 500 words. They will be judged on the basis of understandability to the layman. They must be technically accurate, yet must be understandable to a person with no metallurgical or technical training.

Mail your explanation to THE REVIEW, 7016 Euclid Ave., Cleveland, Ohio, no later than Monday, May 10. No entries will be returned.

V. P. I. Graduate is Speaker At February Meeting

V.P.I. Student Group—On Thursday, Feb. 18, Byron B. Morton of the Development and Research Department, International Nickel Co., addressed a combined meeting of the engineering seminar clubs of the Virginia Polytechnic Institute as a guest of the V.P.I. Student Group of the American Society for Metals.

Mr. Morton is a V.P.I. graduate of the class of '25.

His talk dealt with the mining, smelting, and refining of nickel. He also pointed out the existing and potential commercial uses of nickel, including the effect of nickel in ferrous alloys.

Motion pictures and slides effectively supplemented the lecture.

Recent student speakers and their subjects at the weekly meetings of this group have been R. C. Pultz on "New Methods of Smelting Zinc," J. R. Cardwell on "Abrasion Testing," H. E. Grenoble on "Corrosion Resistant Steels," and W. T. Robins on "Use of Light Metals in Construction."

Mines Men Entertain

The Missouri School of Mines and Metallurgy Group of the American Society for Metals entertained at lunch on Friday, March 12, for E. M. Stephens, assistant personnel director of the United States Steel Corp.

Mr. Stephens was on the campus interviewing those of the Class of '37 who were interested in securing work with the Steel Corporation.

Michigan Tech's Engineering Show to Be Held May 14 & 15

By J. L. Gittlen

A diversified program has been planned by the Michigan Tech metallurgy department for the biennial Engineering Show, which will be held May 14 and 15 on the campus at Houghton.

Plans now in progress call for the use of all available equipment in an effort to provide an unusually interesting exhibit.

Tentative arrangements have been made for non-technical lectures on the structures of metals and alloys, accompanied by motion pictures, as one of the main educational features.

Most interesting to the spectators, however, will probably be the pyrometallurgy exhibit. The operation of the muffle furnaces assaying gold and silver ores and the production of slag-coated ash trays will be a leading attraction. A copper reverberatory furnace will be in operation, and souvenirs will be cast from Lake copper and distributed to spectators.

The ore-dressing laboratory will show working models of milling and concentrating machines. The protective coatings laboratory functions will be explained, and there will be displays dealing with thermal analysis, dilatometry, X-rays and metallography.

Although the show is traditionally planned by the students at Michigan Tech, each department in the College has chosen a faculty committee to oversee its exhibits and assist the students. Instructors W. B. Gertz and Russell Smith, Research Assistant W. E. Keck, and Laboratory Assistants Frank Fisher and Eugene Sullivan are on the faculty committee for the metallurgy department.

Tantalum Was First Electric Lamp Filament

Tantalum Follows Tungsten Carbide Into Prominence as Tool Material

By Walter M. Saunders, Jr.

Rhode Island Chapter—"Hard Carbides as Tool Materials" was the subject of a talk at the March 3rd meeting by Philip M. McKenna, vice-president and research metallurgist of Vanadium-Alloys Steel Co.

Mr. McKenna divided his talk into three parts—the manufacture, properties, and uses of hard carbides—and devoted most of his time to tantalum carbide.

The powder metallurgy of carbide tool materials had its beginning in 1907 with the development of ductile tantalum, which was the filament for the first electric lamp with metallic wire element, except platinum.

First came the cementing of tungsten carbide with cobalt, or nickel. Then, by gradual development, tantalum carbide, sintered with various elements of the iron group in varying proportions of carbide and metal, came into prominence, until last year over 100,000 tools of tantalum carbide were made.

By more or less empirical equations, a tool value for the carbides has been calculated by Mr. McKenna, and a comparison of the various types was of interest.

Has Highest Melting Point

Tantalum carbide has the highest melting point of any known substance, except possibly hafnium carbide, and this property, together with the fact that it is a polar type compound, and tools have desirable thermal conductivity, contributes to one of its most valuable properties—namely, resistance to cratering in machining steel. Heat treated steels up to 500 Brinell are easily machinable with tantalum carbide, and it is the only tool that can satisfactorily machine Hadfield's manganese steel.

In the discussion and question period greatest interest seemed to be shown in the use of tantalum carbide as a thread guide in the textile industry.

The great hardness under compressive stress was illustrated by the statement that balls of tantalum carbide composition would dent a 5-lb. sledge when struck on an anvil.

Since tantalum and carbon must be combined in exact atomic proportion, it was brought out that an excess of tantalum, for instance, will result in brittleness, probably because of the formation of intermetallic compounds. For the same reason decarburization will promote brittleness in contrast to steels.

Welding Is Subject of York Meeting Held March 10

By D. E. Flinchbaugh

York Chapter—Speaker of the meeting on March 10, held at the Chapter headquarters, was J. W. Allison of Westinghouse Electric & Mfg. Co.

With the assistance of slides Mr. Allison presented a thorough conception of the art of welding and its applications. An excellent tabulated set of charts showed the advantages of electric arc welding.

Mr. Allison described the highly specialized knowledge of arc welding that is essential to obtain satisfactory results.

There were 73 members present representing Lancaster, Harrisburg, Waynesboro and Steelton.

Why Stainless Steel Is Stainless

(Continued from page 7)

ing of rust acts as a rust or corrosion preventive on the balance of the material beneath the surface.

If we carry this idea to its limit, we get into the field of stainless steel and why it is stainless. Upon exposure to the atmosphere a film is formed over the surface which, in a sense, corresponds to the film of rust formed on iron. However, this film is so thin that it is transparent, and the metallic color of the stainless steel is readily discernible through it. In fact, the stainless steel film is so thin that one does not realize that it exists. The nature of this film is such that, as in the case of the copper-bearing iron, it protects the material beneath it from further corrosion.

Hence, stainless steel is stainless because it corrodes with a film so thin that it is transparent and so dense that the metal retains its metallic luster beneath it.

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Positions Wanted

GRADUATE METALLURGIST: Available in June. Would like position with up-and-coming concern. Box 4-5.

METALLURGIST: Eight years experience in heavy and alloy steel works, auto parts and machine plants as chemist, metallographer and assistant metallurgist. Graduate chemist; studied metallurgy at C.I.T. Age 33. Box 4-10.

TEACHING POSITION wanted by man with ability to inspire study and initiate and direct research. Thorough training in physical metallurgy; doctorate from eastern school; publications. Six and one-half years industrial experience to broaden outlook. Box 4-15.

METALLURGIST: Penn State graduate 1926. Experienced in laboratory investigations in metallography, physical testing, heat treatment, X-ray radiography, laboratory welding and weld testing. Box 4-20.

FORGING POSITION: Ferrous and non-ferrous metals. Seven years experience mostly on aluminum in die layout, upsetter and pressings and weight calculation. High school education with four years Y Prep School. Box 4-25.

GRADUATE Metallurgical Engineer with eight years practice in ferrous metallurgy (cast iron, steel, welding), thoroughly familiar with routine and research testing, now engaged in development work, wants responsible position as development engineer with progressive firm. References and records of accomplishments can be furnished. Box 4-30.

GRADUATE Metallurgical Engineer (1936): Short experience in steel mill and its laboratory control. Now doing graduate research on fellowship grant. Desires position in research or production. Available June. Box4-40.

GENERAL METALLURGIST: With background of many years melting and foundry practice. Is especially interested in heat treatment of tools and tool steels. Also has sales and sales promotion experience. Box 4-50.

METALLURGIST, with long experience in all phases of grey iron, brass, bronze and aluminum foundry work, available for position of Metallurgist or Foundry Manager, Age 43. Box 4-60.

METALLURGIST: 28 years old; employed since graduation in 1931 with firm specializing in manufacture of stainless steel. Immediate supervision of all metallographic and photographic work. Experience in patent research and reading knowledge of technical French and German. Capable of handling men and dealing with people. $200 per month minimum and opportunity for advancement desired. Box 4-35.

METALLURGICAL ENGINEER, Harvard—M.I.T. graduate, 18 years experience. Experienced in specification and use of all types of steels for free machining, cold heading, stamping, forging, production parts, as well as tools and dies, and their heat treatment; free machining brass and aluminum alloys and their heat treatment. Available on short notice. Box 4-55.

METALLURGICAL ENGINEER with five years experience on teaching and research staff of large metallurgical engineering department in recognized college, desires change. Three degrees in metallurgical engineering. Age 32. Box 4-45.

Positions Open

YOUNG MAN with metallurgical education and experience with processes for heat treatment of steel to train for position of sales engineer for well known manufacturer of electrical pyrometers and automatic temperature control equipment. Candidates preferred with outstanding personality. Must be free for extensive traveling and wide transfers and furnish highest character references. Write stating age, education, experience and salary desired. Box 4-65.

SALES REPRESENTATIVE: Manufacturer of air draw furnaces, high temperature fans, air heaters and safety controls wants representative familiar with heat treating and industrial heating. Sales efforts backed by national advertising campaign. Prefer man who is already selling to this field and who can take on additional line. Box 4-70.

SALESMAN: With metallurgical education and experience to sell heat treating salt baths etc. in the Chicago territory. Salary and commission. Write stating age, education, experience and salary desired. Box 4-75.

CHAPTER CALENDA

DATE	CHAPTER	PLACE	SPEAKER	SUBJEC
Apr. 23	Milwaukee	.....Milwaukee Athletic Club	A. B. Kinzel	..... Factors Affecting Devel... ments in European Ste... Making
Apr. 24	Chicago and Notre Dame	.. Engineering Bldg., Notre Dame University	A. B. Kinzel	..... Deoxidizing and Alloy...
Apr. 28	Columbus, Dayton and Cincinnati	....Columbus		..... Tri-Chapter Meeti...
Apr. 30	Philadelphia	...Engineers Club	J. S. Vanick	..... Modern Cast Iro...
Apr.	Muncie	.....New Castle, Ind.	E. G. DeCoriolis	..... Radiant Tube Furnac...
Apr.	Worcester			..... Physical Testi...
May 3	Cleveland	.....Cleveland Club	E. C. Bain	... Anomalies in Hardening of Steel
May 3	Montreal	.....Windsor Hotel	C. V. Lundvall	..... Tub...
May 4	Mahoning Valley	.....Tod Hotel, Youngstown	E. C. Bain	..... Anomalies in Hardening of St...
May 5	Rhode Island	..Phillipsdale, R. I.		..... Plant Visitation to Washburn Wire C...
May 6	Canton-Mass.	..Hotel Onesto, Canton, Ohio	M. A. Cross	..... Anti-Aircraft Artill...
May 6	Texas		H. W. McQuaid	.....
May 7	Lehigh Valley	..Coatesville, Pa.		..... Plant Visitation to Lukens Steel C...
May 7	Ontario	.....Royal Connaught Hotel, Hamilton	A. E. Gibson	..... Arc Welding of Le... Alloy Ste...
May 10	Baltimore	.....Engineers Club	Matthew Schon	..... Direct Rolling Proce...
May 10	Detroit	.....Hotel Fort Shelby	Charles F. Hardy	..... Powder Metallur...
May 10	Peoria		E. F. Davis	..... Gea...
May 10	Rochester	.....Room 208, Engineering Bldg., University of Rochester	V. N. Krivobok	..... Structure of Met...
May 10	Washington	...Garden Room, Dodge Hotel	E. C. Bain	..... Anomalies in Ha... Treatment of Ste...
May 11	Hartford	.....Hartford Gas Co.	E. R. Johnson	..... Stainless Steel Me...
May 11	North West	...St. Anthony Commercial Club		..... Annual Meet...
May 11	Tri-City	.....Rock Island Arsenal, Rock Island, Ill.	E. W. Stewart	..... Spra...
May 12	Dayton			.....Panel Discussion on New Furna...
May 12	Milwaukee	.....Milwaukee Athletic Club	L. A. Hawkins	.....
May 13	Buffalo	.....Hotel Buffalo		..... Annual Meeti...
May 13	Chicago	.....Medinah Club	L. A. Hawkins	..... Industrial Researc...
May 13	Cincinnati	.....Alms Hotel		.....Cold Rolling Low Carbon Ste...
May 13	Los Angeles	...So. Calif. Edison Bldg.		..... Refractor...
May 13	Pittsburgh	.....Roosevelt Hotel	C. H. Herty, Jr.	.. Grain Size and Hardenabili...
May 14	Boston	.....United Shoe Machinery Corp., Beverly, Mass.	R. F. Harrington	..... Cast Iron and H... Heat Treatme...
May 14	New Jersey			.....Sectional Meeting of Four Chapte...
May 17	New York	.....Third Floor, International Bldg., Rockefeller Center	A. A. Hassan	..... Permanent Magnet Ste...
May 17	Southern Tier	..International Business Machines Corp. Country Clubhouse	Ralph Leiter	.. Stamping, Forming and Dra...
May 18	Saginaw Valley	.Dow Chemical Co., Midland, Mich.	J. A. Gann	..... Magnesium and Light Allo...
May 18	Schenectady	...Wolferts Roost Country Club, Albany		..... Annual Meet...
May 21	New Haven	....Hotel Garde		..... New England Sectional Meet...
May	Muncie		Dr. Chester	..... Pick...
June 11	Ontario	.....Lakeshore Golf & Country Club		..... Ninth Annual Field D...

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